Small Business Innovation Research/Small Business Tech Transfer

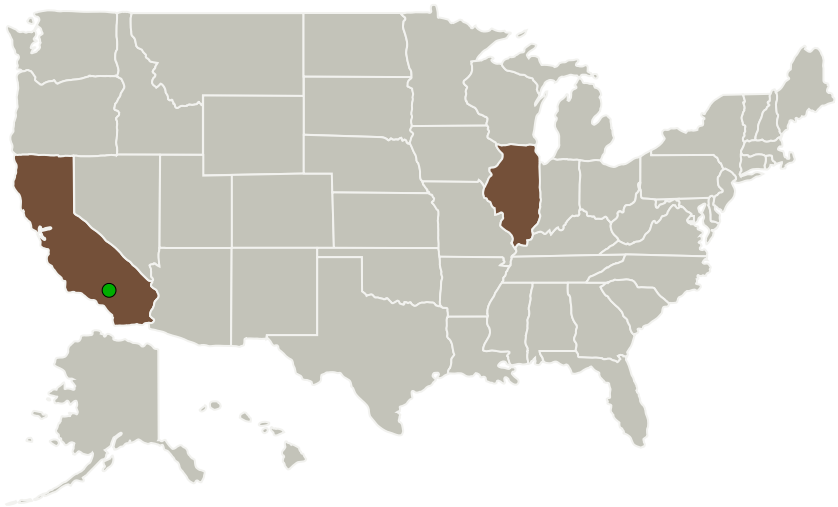
Novel Real-Time Flight Envelope Monitoring System, Phase II

Completed Technology Project (2010 - 2012)

Project Introduction

The proposed innovation is an aircraft flight envelope monitoring system that will provide real-time in-cockpit estimations of aircraft flight envelope boundaries. The adaptable system will provide information on current and predicted aircraft performance and controllability, alerting the pilot to any aerodynamic degradation of the aircraft control surfaces. This includes heavy rain, in-flight icing encounters, environmental contamination of surfaces, and structural damage such as bird strikes or battle damage. The real-time monitoring system measures the unsteady control surface hinge moment from all aircraft aerodynamic controls. Control surface hinge moments are sensitive to the aerodynamics of the section, including separation. These data are processed and information on the current and predicted future state of aircraft performance and control (including asymmetric cases) is made available to the pilot or flight management system. Phase I results have shown that the hinge moment sensor concept is a viable technology for the monitoring and prediction of airfoil stall. The hinge moment monitoring system was able to provide reliable stall warning and prediction across an incredibly wide range of simulated aerodynamic hazards. The proposed aircraft flight envelope monitoring system is an integral part of an overall integrated vehicle health management system.

Primary U.S. Work Locations and Key Partners



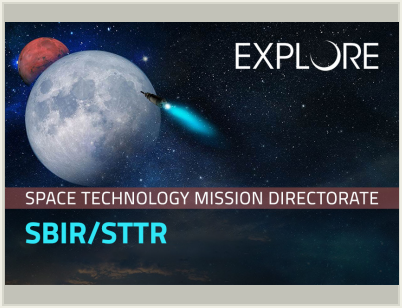


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Table of Contents

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Organizations Performing Work	Role	Type	Location
Rolling Hills Research Corporation	Lead Organization	Industry	El Segundo, California
Armstrong Flight Research Center(AFRC)	Supporting Organization	NASA Center	Edwards, California
Board of Trustees of the University of Illinois	Supporting Organization	Academia	Champaign, Illinois

Primary U.S. Work Locations	
California	Illinois

Project Transitions

August 2010: Project Start

December 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139296)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Rolling Hills Research Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

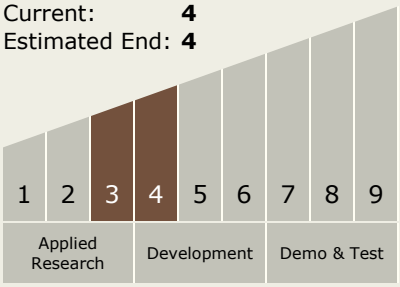
Carlos Torrez

Principal Investigator:

Michael Kerho

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX02 Flight Computing and Avionics
  - TX02.2 Avionics Systems and Subsystems
    - TX02.2.2 Aircraft Avionics Systems

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System